

Laparoscopic Hysteropexy in a Patient with Spina Bifida and Ventriculoperitoneal Shunt

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ABSTRACT

Laparoscopic repair of pelvic organ prolapse in patients with ventriculoperitoneal shunts has not been previously described. The optimum management of patients with ventriculoperitoneal shunts undergoing laparoscopy is uncertain. We describe the case of a 21-year-old female patient with spina bifida and ventriculoperitoneal shunt who underwent laparoscopic hysteropexy for severe pelvic organ prolapse. The implications of performing laparoscopy on patients with ventriculoperitoneal shunts are reviewed along with strategies to reduce potential intraoperative complications.

Key Words: Pelvic organ prolapse, Ventriculoperitoneal shunt, Hysteropexy, Laparoscopy.

INTRODUCTION

A 21-year-old nulliparous female was referred to our minimally invasive gynecologic center in May of 2008 with the chief complaint of symptomatic pelvic organ prolapse (POP). She was diplegic and wheelchair-dependent secondary to spina bifida, for which she had undergone multiple surgical procedures including ventriculoperitoneal shunt (VPS) placement.

Physical examination revealed stage 3 uterine prolapse. Vaginal pessary had failed to correct the condition secondary to an atonic pelvic diaphragm, causing repeated pessary expulsions. She opted for surgical repair and desired future fertility. After neurosurgical consultation was obtained, a decision was made to proceed with laparoscopic pelvic reconstructive surgery.

Patient positioning in a dorsal lithotomy was challenging due to severe kyphosis and contracted lower extremities. Peritoneal access was obtained via open scope laparoscopy. Upon entering the abdomen, marked distortion of the lumbar spine was noted. Multiple loops of VPS were noted in the abdomen and pelvis. There was no evidence of bowel or pelvic adhesions. The reproductive organs appeared grossly normal. Marked attenuation of the uterosacral ligaments was observed. The initial plan was to perform a sacrohysteropexy utilizing mesh. Sacrohysteropexy was, however, decided against given the distorted anatomy, especially at the level of the sacral promontory. Laparoscopic uterosacral suspension did not appear a valid alternative either given the marked attenuation of the ligaments. Thus, it was opted to proceed with uterine transfixation to the anterior abdominal wall utilizing the round ligaments, uterine fundus, and rectus fascia.

Three auxiliary 5-mm trocars were placed under laparoscopic visualization lateral to the inferior epigastric vessels and surapubically. Utilizing a permanent braded zero suture on a CT-1 needle, each round ligament was incorporated into the suture at its pelvic sidewall origin. Each suture was run the entire length of the round ligament. A generous portion of fundal myometrium was incorporated in the suture line at the end bilaterally. The uterine prolapse was reduced using a standard uterine manipulator

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and anteverted so the fundus would be approximated against the abdominal wall. Special care was taken not to overcorrect the anatomy. Two stab incisions were made in the lower abdomen corresponding to the level of the elevated uterine fundus. Pneumoperitoneum was released to relax the abdominal wall during this part of the procedure. Once the placement of stab incisions was confirmed, the free ends of the sutures were brought out through the ipsilateral anterior abdominal stab incision by using the Endo Close (Covidien, Mansfield, MA) device. It was ensured that the free ends of each suture line exited through 2 separate fascial puncture holes, approximately 1cm apart. The sutures were then secured against the rectus fascia extraperitoneally after pneumoperitoneum was released. Laparoscopic visualization confirmed approximation of the fundus against the abdominal wall without a suture bridging effect. Throughout the procedure, the intraperitoneal pressure was decreased from 15mm Hg to 5mm Hg every 30 minutes to minimize changes in the intracranial pressure (ICP). This strategy was recommended by the consulting neurosurgical team as a theoretical means to allow periods of catheter outflow to prevent possible shunt occlusion and a rise in ICP.

The blood loss was minimal, and the operation lasted 65 minutes. The patient recovered from anesthesia uneventfully and was discharged home on the same day. The patient reported immediate symptomatic relief. She was re-examined at 1 month and 3 months postoperatively and continues to remain asymptomatic with excellent pelvic support. Repeat imaging studies verified the shunt to be functional.

DISCUSSION

POP has been associated with neural tube defects.¹ Due to congenital pelvic floor weakness, this condition tends to occur at an age when fertility is desired. As the majority of cases are unresponsive to conservative management, surgical repair is often required. Posterior intravaginal sling-plasty with preservation of the uterus in a young patient with myelomeningocele has been previously described.² Laparoscopy allows for a minimally invasive approach to address POP associated with neural tube defect. Because the majority of these patients have VPS in place, laparoscopy poses unique challenges to perform and potential perioperative complications.

During laparoscopy in patients with VPS, there are 2 primary theoretical concerns. First, a rise in ICP can occur that is mainly attributed to an increase in vena caval pressure during abdominal insufflation and subsequent

engorgement of cerebral veins.³ Secondly, retrograde CO₂ insufflation of cerebrospinal spaces (hypercapnia) through an incompetent shunt valve mechanism may result in cerebral hypertension.^{3,4} In patients with VPS, increases in ICP during insufflation could potentially become significantly increased due to resistance from the shunt outflow by pneumoperitoneum.⁴ This is why intermittent release of the pneumoperitoneum was used in this case in an attempt to avoid such a complication. Despite this potential concern, successful laparoscopic procedures in patients with VPS have been described in the general surgical, urologic, and gynecologic literature.^{3,5-11} With regard to an incompetent valve mechanism, an in vitro study showed that for the disruption of the shunt valve to occur allowing a retrograde flow, a pressure of at least 80mm Hg would be needed. Therefore, the risk of valve failure is rather small, because intraabdominal pressure rarely exceeds 20mm Hg in laparoscopy.¹²

Various techniques have been described to minimize changes in the ICP in laparoscopy. Some authors have described clamping the VPS catheter during surgery, while lower insufflation pressures during laparoscopy may also be entertained.^{7,8,11} Some authors have also suggested intraoperative ICP monitoring and ventricular drainage of CSF from the ventriculoperitoneal shunt reservoir when the ICP is elevated.³ Externalization of the catheter prior to laparoscopy has also been described.¹⁰ Finally, laparoscopy has been demonstrated to be safe in the presence of VPS without catheter clamping.^{4,9}

Ravaoherisoa et al¹³ described a case of gynecologic laparoscopy in the presence of VPS. The authors used transcranial Doppler to monitor shunt function in a patient who underwent laparoscopic resection of an ovarian cyst. It was found that transient alteration of shunt function only occurred during episodes of high intraabdominal pressure.

We adopted a simple strategy in collaboration with the neurosurgical team to minimize intraoperative changes in the ICP. After achieving a pneumoperitoneum of 15mm Hg, the intraperitoneal pressure was reduced to 5mm Hg every 30 minutes throughout the case to ensure intermittent catheter outflow. Postoperatively, the patient recovered without any signs of neurologic complications. Postoperative shuntogram confirmed shunt patency. Our experience contributes evidence towards a more conservative approach in shunt management during laparoscopy. It is prudent to monitor the patient for neurologic signs or symptoms of shunt failure and ICP changes. As many female patients with VPS continue to reach adult-

hood while leading productive lives, laparoscopic surgery will become more frequent in this population. Therefore, it is important that laparoscopic surgeons be intimately familiar with potential complications and implications of performing surgery on such patients. We acknowledge that round ligament hysteropexy is not recognized as the standard surgical approach to pelvic organ prolapse. Round ligament hysteropexy, however, may be the only viable option in patients with extreme distortion of anatomy (as in spina bifida) in whom sacrohysteropexy and uterosacral ligament suspension may not be technically feasible.

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